

## SEQUENCE LISTING

<110> Fedida, David  
Steele, David

<120> MUTATIONS OF VOLTAGE-GATED ION CHANNELS  
THAT ALLOW THEM TO EXPRESS A VOLTAGE-INDEPENDENT PHENOTYPE  
AND AN IMPROVED METHOD TO USE THE SAME

<130> 480102.425USPC

<140> US  
<141> 2003-07-14

<150> US 60/395,272  
<151> 2002-07-12

<160> 13

<170> FastSEQ for Windows Version 4.0

<210> 1  
<211> 45  
<212> DNA  
<213> Homo sapiens

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45

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<212> DNA  
<213> Homo sapiens

<400> 2  
ttgaagattt gaacacccgg accagtttga tgacttggag gatg

44

<210> 3  
<211> 33  
<212> DNA  
<213> Homo sapiens

<400> 3  
attgccctgc ctgtggacgt catcgcttcc aac

33

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<400> 4  
ttggagacga tgacgtccac aggcagggca atg

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<210> 5  
 <211> 159  
 <212> PRT  
 <213> Homo sapiens

<400> 5  
 Pro Tyr Phe Ile Thr Leu Gly Thr Glu Ile Ala Glu Gln Glu Gly Asn  
 1 5 10 15  
 Gln Lys Gly Glu Gln Ala Thr Ser Leu Ala Ile Leu Arg Val Ile Arg  
 20 25 30  
 Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly  
 35 40 45  
 Leu Gln Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu Gly  
 50 55 60  
 Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser Ala  
 65 70 75 80  
 Val Tyr Phe Ala Glu Ala Glu Ala Glu Ser His Phe Ser Ser Ile  
 85 90 95  
 Pro Asp Ala Phe Trp Trp Ala Val Val Ser Met Thr Thr Val Gly Tyr  
 100 105 110  
 Gly Asp Met Tyr Pro Val Thr Ile Gly Gly Lys Ile Val Gly Ser Leu  
 115 120 125  
 Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile  
 130 135 140  
 Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu  
 145 150 155

<210> 6  
 <211> 160  
 <212> PRT  
 <213> Mus Musculus

<400> 6  
 Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Lys Pro Glu Asp  
 1 5 10 15  
 Ala Gln Gln Gly Gln Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile  
 20 25 30  
 Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys  
 35 40 45  
 Gly Leu Gln Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu  
 50 55 60  
 Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser  
 65 70 75 80  
 Ala Val Tyr Phe Ala Glu Ala Asp Glu Arg Asp Ser Gln Phe Pro Ser  
 85 90 95  
 Ile Pro Asp Ala Phe Trp Trp Ala Val Val Ser Met Thr Thr Val Gly  
 100 105 110  
 Tyr Gly Asp Met Val Pro Thr Thr Ile Gly Gly Lys Ile Val Gly Ser  
 115 120 125  
 Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val  
 130 135 140  
 Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu  
 145 150 155 160

<210> 7  
 <211> 161  
 <212> PRT  
 <213> Homo sapiens

<400> 7  
 Pro Tyr Phe Ile Thr Leu Gly Thr Asp Leu Ala Gln Gln Gln Gly Gly  
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 Gly Asn Gly Gln Gln Gln Ala Met Ser Phe Ala Ile Leu Arg Ile  
 20 25 30  
 Ile Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser  
 35 40 45  
 Lys Gly Leu Gln Ile Leu Gly His Thr Leu Arg Ala Ser Met Arg Glu  
 50 55 60  
 Leu Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser  
 65 70 75 80  
 Ser Ala Val Tyr Phe Ala Glu Ala Asp Glu Pro Thr Thr His Phe Gln  
 85 90 95  
 Ser Ile Pro Asp Ala Phe Trp Trp Ala Val Val Thr Met Thr Thr Val  
 100 105 110  
 Gly Tyr Gly Asp Met Lys Pro Ile Thr Val Gly Gly Lys Ile Val Gly  
 115 120 125  
 Ser Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro  
 130 135 140  
 Val Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Asn  
 145 150 155 160  
 Glu

<210> 8  
 <211> 157  
 <212> PRT  
 <213> Homo sapiens

<400> 8  
 Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Arg Gln Gly Asn  
 1 5 10 15  
 Gly Gln Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile Arg Leu Val  
 20 25 30  
 Arg Val Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly Leu Gln  
 35 40 45  
 Ile Leu Gly Gln Thr Leu Lys Ala Ser Met Arg Glu Leu Gly Leu Leu  
 50 55 60  
 Ile Phe Phe Leu Phe Ile Gly Val Ile Leu Phe Ser Ser Ala Val Tyr  
 65 70 75 80  
 Phe Ala Glu Ala Asp Asp Pro Thr Ser Gly Phe Ser Ser Ile Pro Asp  
 85 90 95  
 Ala Phe Trp Trp Ala Val Val Thr Met Thr Thr Val Gly Tyr Gly Asp  
 100 105 110  
 Met His Pro Val Thr Ile Gly Gly Lys Ile Val Gly Ser Leu Cys Ala  
 115 120 125  
 Ile Ala Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile Val Ser

130	135	140
Asn Phe Asn Tyr Phe Tyr His Arg Glu Thr Glu Gly Glu		
145	150	155

<210> 9  
 <211> 164  
 <212> PRT  
 <213> Homo sapiens

<400> 9  
 Pro Tyr Phe Ile Thr Leu Gly Thr Glu Leu Ala Glu Gln Gln Pro Gly  
 1 5 10 15  
 Gly Gly Gly Gly Gln Asn Gly Gln Gln Ala Met Ser Leu Ala Ile  
 20 25 30  
 Leu Arg Val Ile Arg Leu Val Arg Val Phe Arg Ile Phe Lys Leu Ser  
 35 40 45  
 Arg His Ser Lys Gly Leu Gln Ile Leu Gly Lys Thr Leu Gln Ala Ser  
 50 55 60  
 Met Arg Glu Leu Gly Leu Leu Ile Phe Phe Leu Phe Ile Gly Val Ile  
 65 70 75 80  
 Leu Phe Ser Ser Ala Val Tyr Phe Ala Glu Ala Asp Asn Gln Gly Thr  
 85 90 95  
 His Phe Ser Ser Ile Pro Asp Ala Phe Trp Trp Ala Val Val Thr Met  
 100 105 110  
 Thr Thr Val Gly Tyr Gly Asp Met Arg Pro Ile Thr Val Gly Gly Lys  
 115 120 125  
 Ile Val Gly Ser Leu Cys Ala Ile Ala Gly Val Leu Thr Ile Ala Leu  
 130 135 140  
 Pro Val Pro Val Ile Val Ser Asn Phe Asn Tyr Phe Tyr His Arg Glu  
 145 150 155 160  
 Thr Asp His Glu

<210> 10  
 <211> 171  
 <212> PRT  
 <213> Drosophila melanogaster

<400> 10  
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 1 5 10 15  
 Leu Asn Leu Pro Lys Ala Pro Val Ser Pro Gln Asp Lys Ser Ser Asn  
 20 25 30  
 Gln Ala Met Ser Leu Ala Ile Leu Arg Val Ile Arg Leu Val Arg Val  
 35 40 45  
 Phe Arg Ile Phe Lys Leu Ser Arg His Ser Lys Gly Leu Gln Ile Leu  
 50 55 60  
 Gly Arg Thr Leu Lys Ala Ser Met Arg Glu Leu Gly Leu Leu Ile Phe  
 65 70 75 80  
 Phe Leu Phe Ile Gly Val Val Leu Phe Ser Ser Ala Val Tyr Phe Ala  
 85 90 95  
 Glu Ala Gly Ser Glu Asn Ser Phe Phe Lys Ser Ile Pro Asp Ala Phe  
 100 105 110

Trp Trp Ala Val Val Thr Met Thr Thr Val Gly Tyr Gly Asp Met Thr  
     115                  120                  125  
 Pro Val Gly Val Trp Gly Lys Ile Val Gly Ser Leu Cys Ala Ile Ala  
     130                  135                  140  
 Gly Val Leu Thr Ile Ala Leu Pro Val Pro Val Ile Val Ser Asn Phe  
     145                  150                  155                  160  
 Asn Tyr Phe Tyr His Arg Glu Thr Asp Gln Glu  
     165                  170

<210> 11  
 <211> 163  
 <212> PRT  
 <213> Rattus norvegicus

<400> 11  
 Pro Phe Tyr Leu Glu Val Gly Leu Ser Gly Leu Ser Ser Lys Ala Ala  
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 Lys Asp Val Leu Gly Phe Leu Arg Val Val Arg Phe Val Arg Ile Leu  
     20                  25                  30  
 Arg Ile Phe Lys Leu Thr Arg His Phe Val Gly Leu Arg Val Leu Gly  
     35                  40                  45  
 His Thr Leu Arg Ala Ser Thr Asn Glu Phe Leu Leu Ile Ile Phe  
     50                  55                  60  
 Leu Ala Leu Gly Val Leu Ile Phe Ala Thr Met Ile Tyr Tyr Ala Glu  
     65                  70                  75                  80  
 Arg Ile Gly Ala Gln Pro Asn Asp Pro Ser Ala Ser Glu His Thr His  
     85                  90                  95  
 Phe Lys Asn Ile Pro Ile Gly Phe Trp Trp Ala Val Val Thr Met Thr  
     100                 105                 110  
 Thr Leu Gly Tyr Gly Asp Met Tyr Pro Gln Thr Trp Ser Gly Met Leu  
     115                 120                 125  
 Val Gly Ala Leu Cys Ala Leu Ala Gly Val Leu Thr Ile Ala Met Pro  
     130                 135                 140  
 Val Pro Val Ile Val Asn Asn Phe Gly Met Tyr Tyr Ser Leu Ala Met  
     145                 150                 155                 160  
 Ala Lys Gln

<210> 12  
 <211> 156  
 <212> PRT  
 <213> Rattus norvegicus

<400> 12  
 Pro Tyr Tyr Val Thr Ile Phe Leu Thr Glu Ser Asn Lys Ser Val Leu  
     1                  5                  10                  15  
 Gln Phe Gln Asn Val Arg Arg Val Val Gln Ile Phe Arg Ile Met Arg  
     20                 25                 30  
 Ile Leu Arg Ile Leu Lys Leu Ala Arg His Ser Thr Gly Leu Gln Ser  
     35                 40                 45  
 Leu Gly Phe Thr Leu Arg Arg Ser Tyr Asn Glu Leu Gly Leu Leu Ile  
     50                 55                 60  
 Leu Phe Leu Ala Met Gly Ile Met Ile Phe Ser Ser Leu Val Phe Phe

65	70	75	80												
Ala	Glu	Lys	Asp	Glu	Asp	Asp	Thr	Lys	Phe	Lys	Ser	Ile	Pro	Ala	Ser
				85				90					95		
Phe	Trp	Trp	Ala	Thr	Ile	Thr	Met	Thr	Thr	Val	Gly	Tyr	Gly	Asp	Ile
							100		105				110		
Tyr	Pro	Lys	Thr	Leu	Leu	Gly	Lys	Ile	Val	Gly	Gly	Leu	Cys	Cys	Ile
							115		120			125			
Ala	Gly	Val	Leu	Val	Ile	Ala	Leu	Pro	Ile	Pro	Ile	Ile	Val	Asn	Asn
							130		135			140			
Phe	Ser	Glu	Phe	Tyr	Lys	Glu	Gln	Lys	Arg	Gln	Glu				
					145		150			155					

<210> 13  
<211> 149  
<212> PRT  
<213> *Homo sapiens*

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<400> 13
Pro Tyr Tyr Ile Gly Leu Val Met Thr Asp Asn Glu Asp Val Ser Gly
 1           5           10           15
Ala Phe Val Thr Leu Arg Val Phe Arg Val Phe Arg Ile Phe Lys Phe
 20          25          30
Ser Arg His Ser Gln Gly Leu Arg Ile Leu Gly Tyr Thr Leu Lys Ser
 35          40          45
Cys Ala Ser Glu Leu Gly Phe Leu Leu Phe Ser Leu Thr Met Ala Ile
 50          55          60
Ile Ile Phe Ala Thr Val Met Phe Tyr Ala Glu Lys Gly Ser Ser Ala
 65          70          75          80
Ser Lys Phe Thr Ser Ile Pro Ala Ala Phe Trp Tyr Thr Ile Val Thr
 85          90          95
Met Thr Thr Leu Gly Tyr Gly Asp Met Val Pro Lys Thr Ile Ala Gly
 100         105         110
Lys Ile Phe Gly Ser Ile Cys Ser Leu Ser Gly Val Leu Val Ile Ala
 115         120         125
Leu Pro Val Pro Val Ile Val Ser Asn Phe Ser Arg Ile Tyr His Gln
 130         135         140
Asn Gln Arg Ala Asp
 145

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